

RSS OTL Report

Randy G Herrera
Radio Science Operations Tech Lead
JPL/CalTech

June 12-13, 2000

- ECR Status
- SOPC Status
- Project Developments
- DSN Ops Development
- Ops Team Development Status

ECR Status

- ECR #82324 - Definition of Quiet S/C for Radio Science
 - Submitted and sent out for Impact
 - Revised and sent out again for Impact
 - 4 instrument teams (CAPS, CIRS, INMS, and VIMS) yet to respond (as of 5/26/00)
 - 2 flight teams (SP and SE) yet to respond
 - Needs to be resolved for ICO-2
- ECR #100066 - Navigation Support of GWE
 - Submitted after last Team Mtg
 - Approved on 4/27/00
- Process has changed; CARs are now used to request new activities (science or engineering) instead of ECRs
 - Requirements changes will still require ECR

SOPC Status

- casrss2 is up and running in 264-860 (RS Ops Area)
- All Team members' accounts should be active
 - Please verify
- ITAR responsibility lies with Dept of State
 - Applying much tougher oversight
 - “Basic research” (like Cassini) is being included
 - Need to begin working future foreign access right away
 - Access for grad students may be impossible
- Related: Please verify access to cassini-inside website
 - User account & password needed (call SOS Desk at 818-393-0767)
 - <https://cassini-inside.jpl.nasa.gov>

SOPC Users

- trina Trina L Ray
- jwarmstr John W Armstrong
- njr Nicole J Rappaport
- essam Essam A Marouf
- rfrench Richard G French
- anagy Andrew F Nagy
- iess Luciano Iess
- ambrosin Roberto Ambrosini
- mflasar F Michael Flasar
- akliore Arvydas J Kliore
- rherrera Randy G Herrera
- danielw Daniel Winterhalter
- duf Don U Fleischman
- schinder Paul J Schinder
- jdanders John D Anderson
- zinar Richard L Zinar

Project Developments

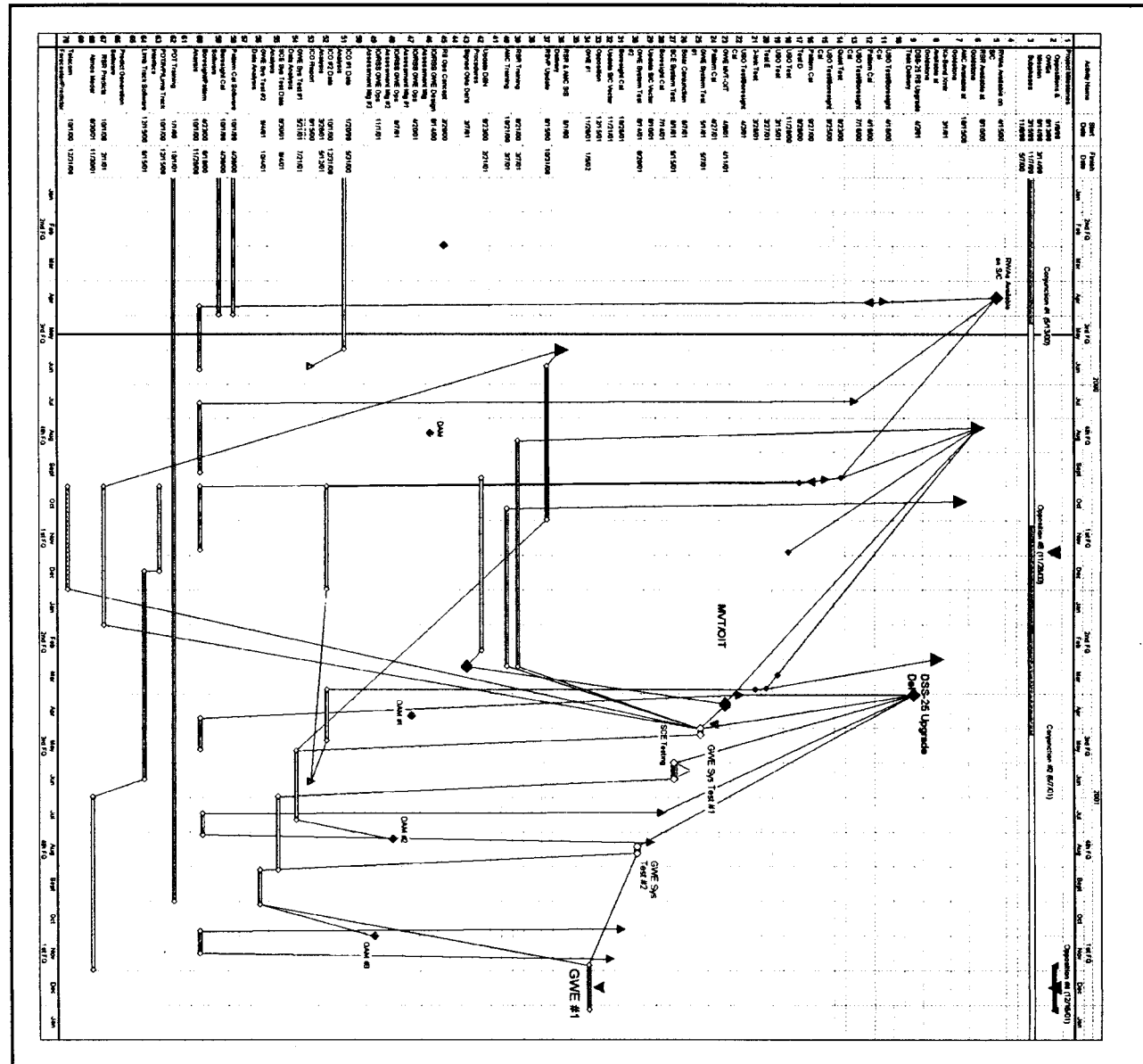
- Frank Parker, IO Team Manager, has retired
 - Suggesting possible re-org of IO within SAUL
- Briefed Project on IO/RSS Task on 3/9/00 (emphasis on budgetary needs)
- Mark Gatti briefed Project on Upgrade Task on 4/3/00
- Presented GWE IO/RSS tasks to Independent Cost Review on 5/31/00

DSN Ops Development

- RSR Data files
 - RSR developers want to avoid lengthy documentation effort
 - Provide listing of data fields
 - Provide .h (dot h) file (contains formatting for data file)
 - Choices are:
 - Force developers to produce bitmap
 - Force all users to use C to read data file
 - RSSG writes & distributes C reader to users
 - RSSG writes & distributes FORTRAN reader to users
- Bigger Issue: What are Investigators expecting from Ops Team?
 - ASCII?
 - Binary?
 - Residuals?

Ops Team Development Status

- Significant Project Milestone in August '00
 - Design Assessment Meeting (DAM) for IO/RSS scheduled for 8/17/00
- Funding for IO/RSS for FY'01 unknown at this time
 - Probably will know allocation in August '00
- Don Fleischman hired ~1 year ago
 - Continuing training for analysis
 - Repeated some & extended other portions of E. Marouf's analysis for ICO-1 (non-coherent) data
 - Will be complete by next Team Mtg
- Telecom Forecaster/Predictor (TFP)
 - Multimission link analysis software
 - Originally anticipated in April '00 timeframe
 - Delayed due to funding issues
- Limb Track Software
 - Funding N. Rappaport part-time for remainder of FY 2000
 - Issue: How will we verify "processed" inputs?



MP/SVT Status

**Trina Ray and Gene Goltz
Radio Science Operations Engineers
JPL/CalTech**

June 12-13, 2000

- **Topics**
 - **MPVT and SVT Support**
 - **ICO-2 Subphase**
 - **Jupiter Subphase**
 - **Quiet Cruise Subphase (through GWE #1)**

MPVT and SVT Support

- MPVT and SVT support
 - Gene Goltz is the IO-RSS Rep and Daniel Winterhalter is the RST Rep for the ICO2 subphase (C20-C22) - two CARs submitted (Quiet Test, and repeat of Test D)
 - Trina Ray is the IO-RSS Rep and Mike Flasar is the RST Rep for the Jupiter subphase (C23-C25) -- currently working RSS issues within OSOWT and SPVT
 - Gene Goltz will be the IO-RSS Rep and John Armstrong(?) will be the RST Rep for the first four sequences (C26-C29) of the Quiet Cruise subphase (1 May 2001 through 13 January 2002)

ICO-2 Subphase Planning Overview

- Sequences C20-C22
- Sequence Execution from 6 May 2000 through 5 November 2000

Event	SEQ	YEAR/DOY UTC	Date	Notes
Superior Conjunction	C20	2000/134	May 13, 2000	
Ka-Band ON	C20	2000/127 to 2000/189	May 6, 2000 to Jul 7, 2000	For monopulse demos and DSN Engineering Link Analysis Tests
USO #6 and PIM	C21	2000/200 10:15 to 16:15	Jul 18, 2000	
Boresight Cal #2	C21	2000/200 16:16 to 18:15	Jul 18, 2000	2 Boresights, one for X-band (.5 degrees); one for Ka-band (.2 degrees) RSR not available yet
Quiet Test	C22	2000/267	Sep 23, 2000	with F&P instruments
USO #7 and PIM	C22	2000/269	Sep 25, 2000	
Boresight Cal #3	C22	2000/269	Sep 25, 2000	1 Boresight for both Ka-band and X-band (.5 degrees); RSR available
Pattern Cal #2	C22	2000/271	Sep 27, 2000	1 Pattern for Ka-, X-, and S-band ; RSR available
Test D	C22	2000/272	Sep 28, 2000	Xup, X/Ka-dn

ICO-2 Subphase Planning Issues and Concerns

- Ka-band Boresight pointing vector (IVP) update - open issue
 - current scheme (OIA) has IVP updates occurring in the background sequence 10 weeks before uplink
 - our plan is that we update within roughly 30 days to practice the GWE scenario using a realtime command based on July Boresight Calibration
- Radio Science Receiver (RSR) readiness at Goldstone
 - double the test time and use DSP to record X then Ka for July 2000 activities
 - expected for September 2000 activities

Jupiter Subphase Planning Overview

- Sequences C23-C25
- Sequence Execution from 6 November 2000 through 30 April 2001

Event	SEQ	YEAR/DOY UTC	Date	Notes
Ka-Band ON	C23	2000/317 to 2001/???	Nov 13, 2000 to TBD	Using modified Ops Mode, due to power. Phase G still under construction.
USO #8 and PIM	C23	2000/333	Nov 27, 2000	Part of Jupiter template, force a Goldstone pass to be 1-way
USO #9 and PIM	C25	2001/077	Mar 18, 2001	
Test E	C25	2001/082	Mar 23, 2001	Ka-band up/down test
Test 3-link	C25	2001/087	Mar 28, 2001	X/Ka up, X/Ka/Ka' down
Boresight Cal #4	C25	2001/092	Apr 2, 2001	30 days prior to GWE System Test
OIT/MVT	C25	2001/099 to 101	Apr 9 to 11, 2001	Operational Interference and Mission Verification Tests (all frequencies, all configurations, all complexes)
DELIVERY OF NEW INSTRUMENT	C25	2001/105	Apr 15, 2001	
OIT/MVT followup	C25	2001/113 & 114	Apr 23/24, 2001	Operational Interference and Mission Verification Tests - followup
Pattern Cal #3	C25	2001/117	Apr 27, 2001	

Jupiter Subphase Schedule/Deadlines

- USO in November and Ka-band ON through February 2001 are the only activities integrated into the Jupiter timeline. All the rest of the Radio Science activities fall into the Phase G subphase due for science integration in June.
- SPVT C23 starts in April 2000
- SPVT C24 starts in June 2000
- SPVT C25 starts in August 2000

Jupiter Subphase Issues and Concerns

- Delivery of Cassini Upgrade Task

Quiet Cruise Subphase Planning Overview

- Sequences C26-C29
- Sequence Execution from 1 May 2001 through 13 January 2002

Event	SEQ	YEAR/DOY UTC	Date	Notes
GWE System Test #1	C26	2001/121-127	May 1-7, 2001	
SCE Test	C26	2001/152-166	Jun 1-15, 2001	Not yet approved – CAR due later this year.
Solar Conjunction	C26	2001/156	Jun 7, 2001	
USO #9	C27	2001/196	Jul 15, 2001	Ka-band up/down test
Boresight Cal #5	C27	2001/196	Jul 15, 2001	30 days prior to GWE System Test #2
GWE System Test #2	C27	2001/226-232	Aug 14-20, 2001	
USO #10	C28	2001/319	Nov 15, 2001	30 days prior to GWE
GWE #1	C28	2001/330-2002/5	Nov 26, 2000- Jan 5, 2001	

Quiet Cruise Subphase Planning Schedule/Deadlines

- The inception of Mission Planning and Car submission is undefined
 - No consensus on process (MP->SVT or SP->SVT)
 - Budget seems to be the barricade
 - We are prepared, but other teams will be diverted by Jupiter Science and late submission might be a real problem
- CARs due July 2000 (best estimate)
 - Solar Conjunction Experiment (SCE) Testing only activity that needs a CAR
 - attempting to partner with SCO

Quiet Cruise Subphase Planning Issues and Concerns

- **Cassini Upgrade Task**
 - testing in February, March, & April 2001 (closed-loop and open-loop)
 - delivery no later than 15 April 2001 (M. Gatti)

RSS Operations Status

**Trina Ray and Gene Goltz
Radio Science Operations Engineers
JPL/CalTech**

June 12-13, 2000

- **Topics**
 - Health & Safety
 - RSS Activity Summary
 - Operations Support
 - HGA Boresight and Pattern and Boresight Results (to date)

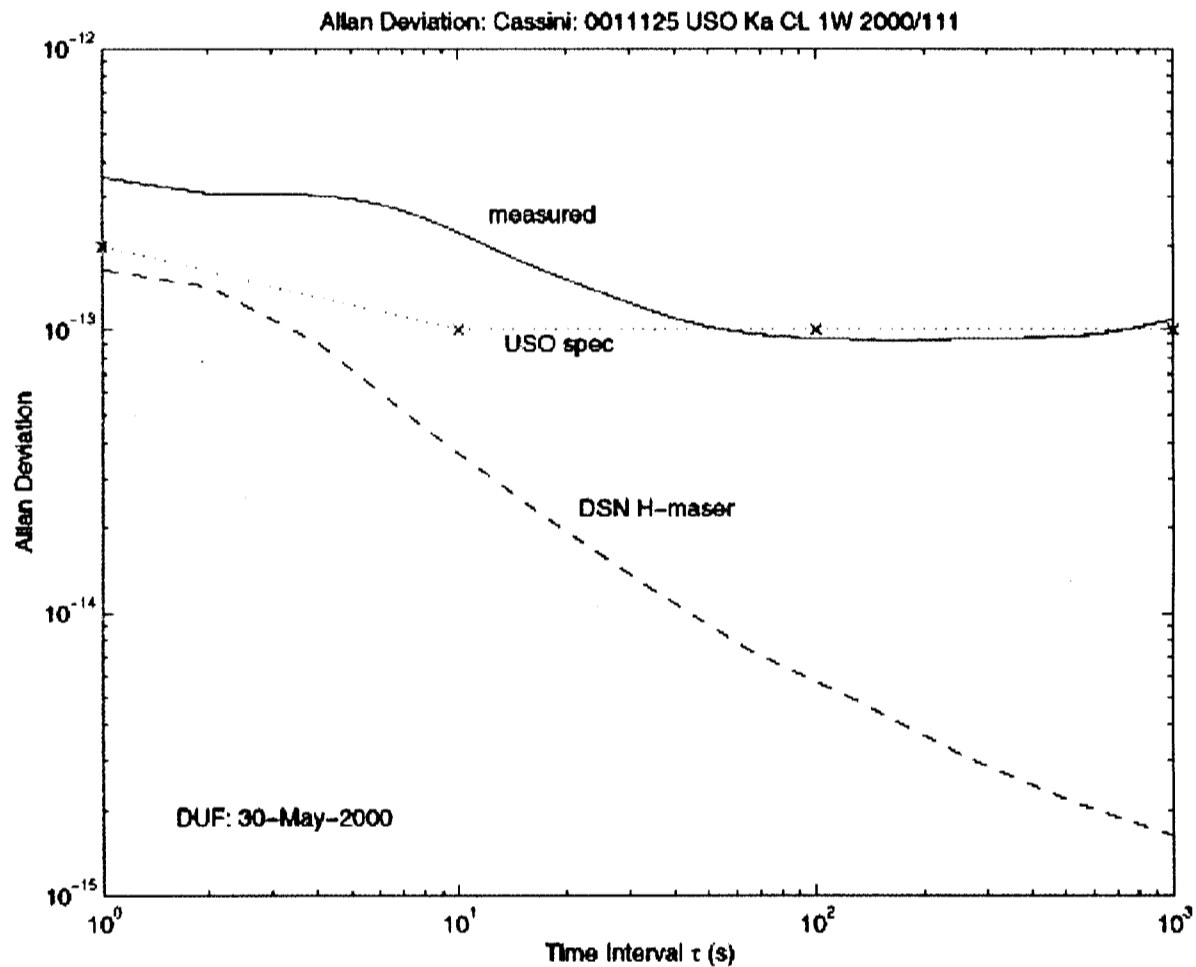
Health and Safety

- S/C Health
 - Nominal
 - C18 and C19 executed successfully, C20 currently executing
- Instrument Health
 - All temperatures and currents as expected - nominal
 - Since last RST Meeting, Ka-TWTA maintenance (formerly RFIS PIM) has been done twice - April 18-20, 2000 and May 6 - June 2, 2000
 - Temperatures and currents were nominal
- Reporting
 - Daily reports will continue to be provided after every DSN pass
 - More detailed reports will be provided after each RSS activity

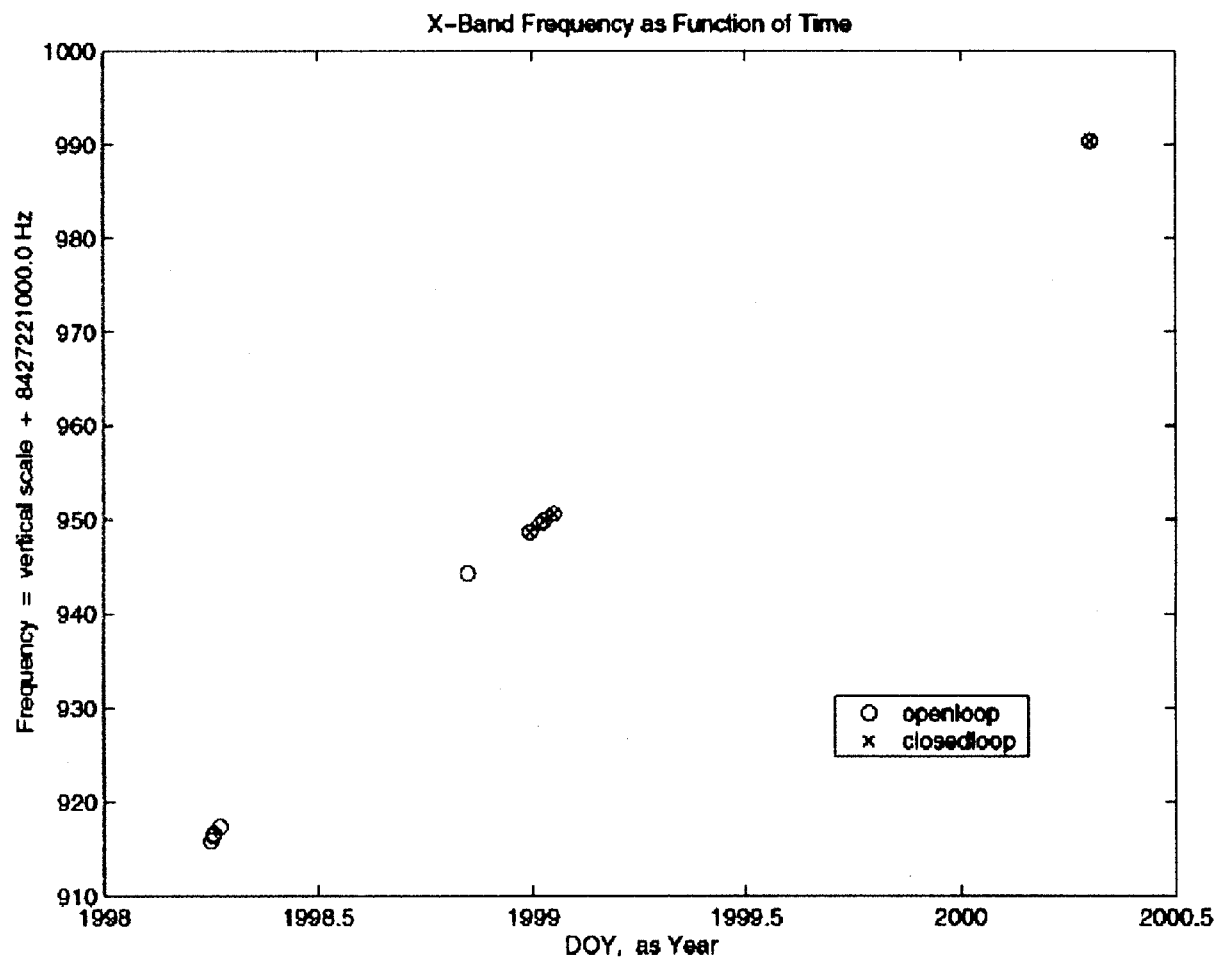
RSS Activity Summary

Event	SEQ	YEAR/DOY UTC	Date	Notes
PIM #7	C13	1999/119 18:45:00	Apr 29, 1999	Nominal
Venus-2	C14	1999/175 20:30:59	Jun 24, 1999	Venus-2 Occultation
PIM #8	C15	1999/208 16:30:00	Jul 27, 1999	Nominal
Earth Flyby	C15	1999/230 03:28:25	Aug 18, 1999	Earth Gravity Field Measurement
PIM #9	C16	1999/269 03:45:00	Sep 26, 1999	Nominal
PIM#10	C18	2000/019 21:38:00	Jan 19, 2000	Nominal
Pattern Cal	C19	2000/109 11:45:00	Apr 18, 2000	No S-band, DSP recorded Ka then X 1 Pattern maneuver done (small then large is part of the maneuver)
USO #5	C19	2000/111 12:09:00	Apr 20, 2000	No S-band, DSP recorded X-band
Boresight Cal	C19	2000/111	Apr 20, 2000	No S-band, DSP recorded Ka then X 2 Boresight maneuvers done
Ka-band ON	C20	2000-127 + 08:22:35	May 6, 2000 +	DSN Engineering and Link Testing and Ka-band Monopulse Demos

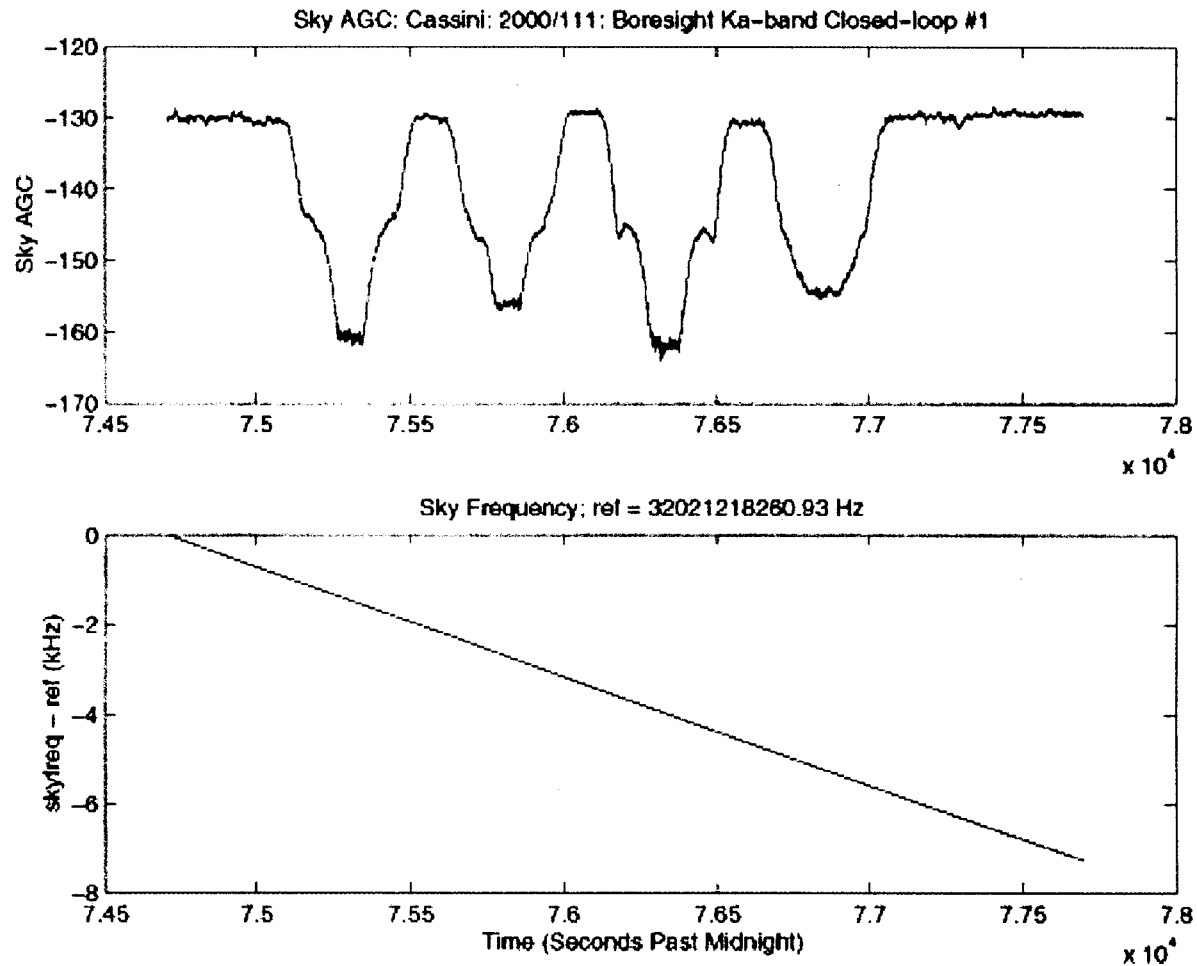
USO Characterization Plot for USO #5



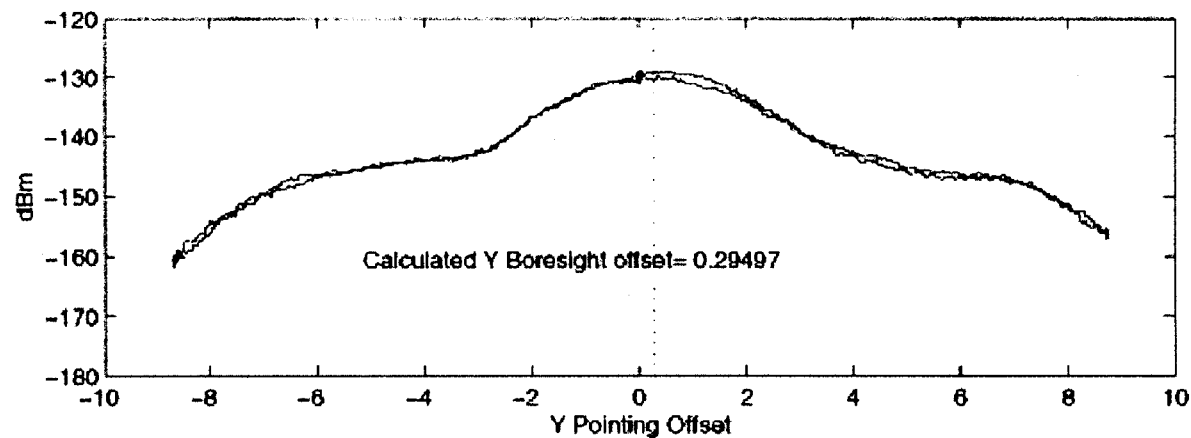
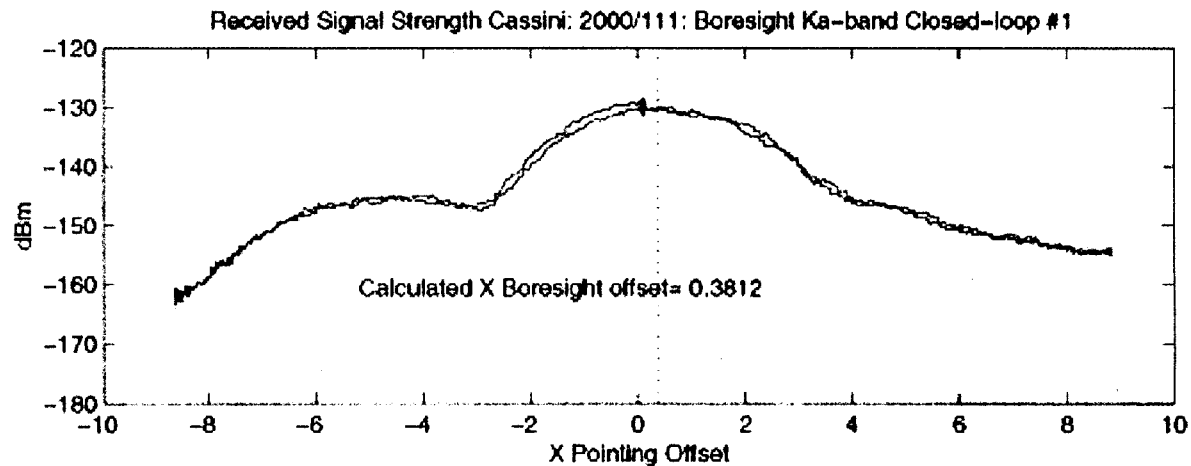
USO Frequency History Plot



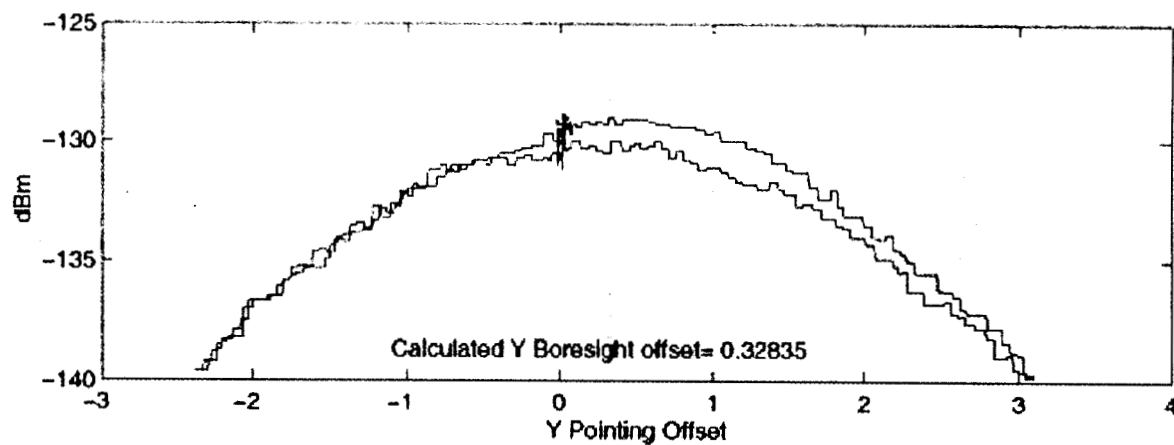
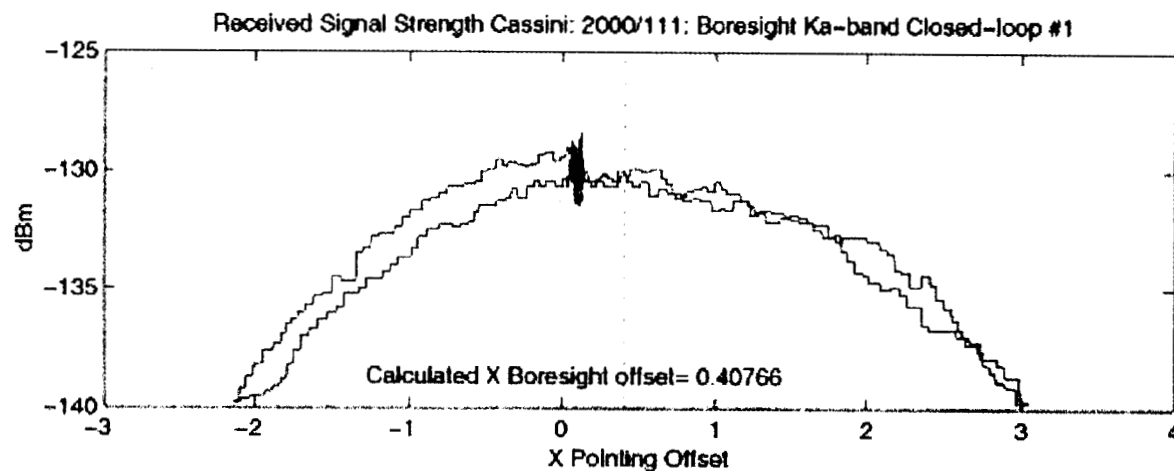
Boresight #1a: Ka-band Closed-loop (time vs. AGC)



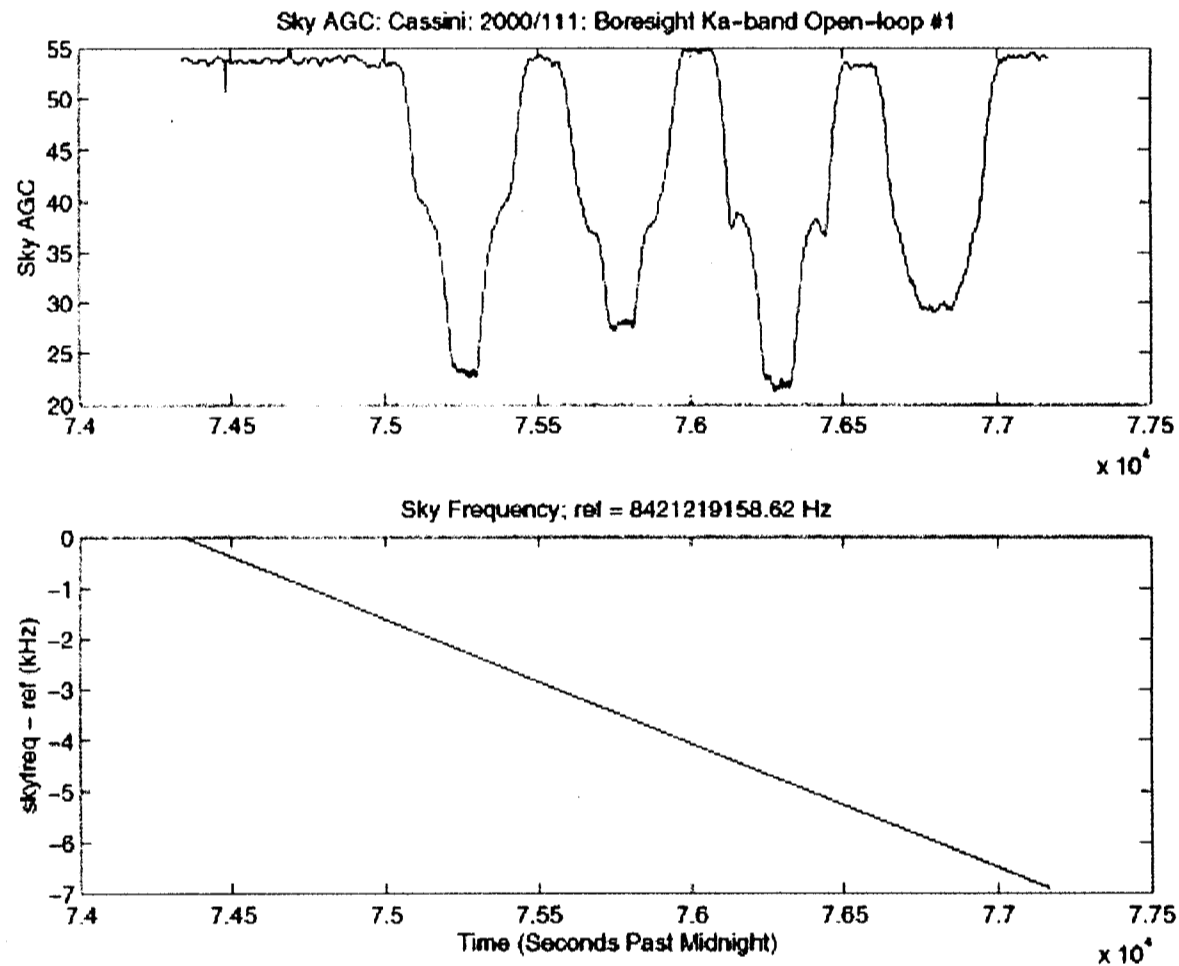
Boresight #1a: Ka-band Closd-loop (pnting vs. pwr)



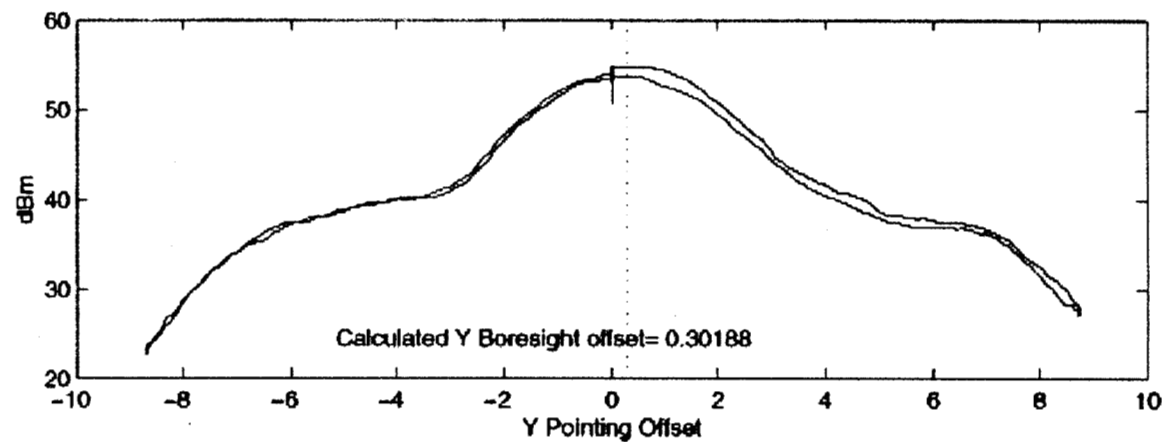
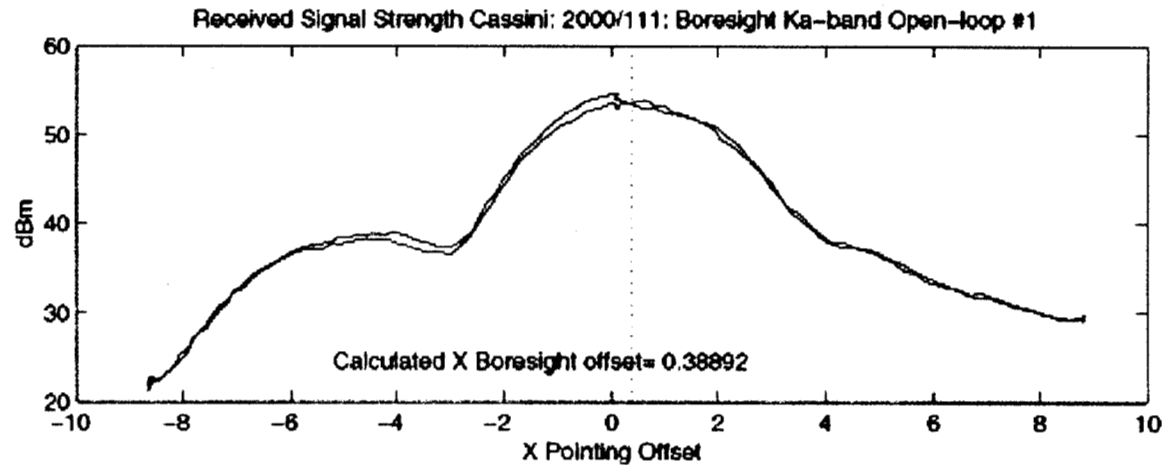
Boresight #1a: Ka-band Cldsd-loop (pnting vs. pwr)



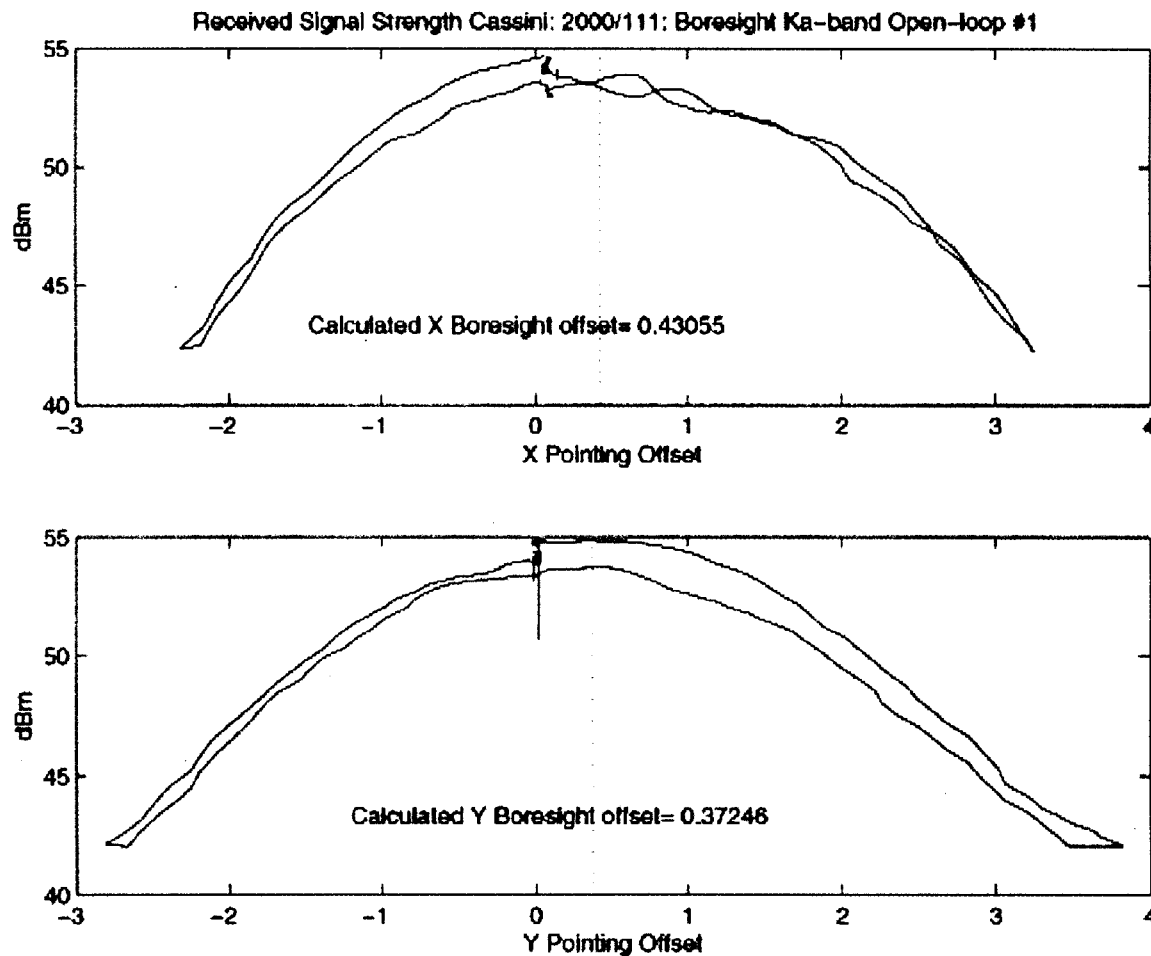
Boresight #1a: Ka-band Open-loop (time vs. AGC)



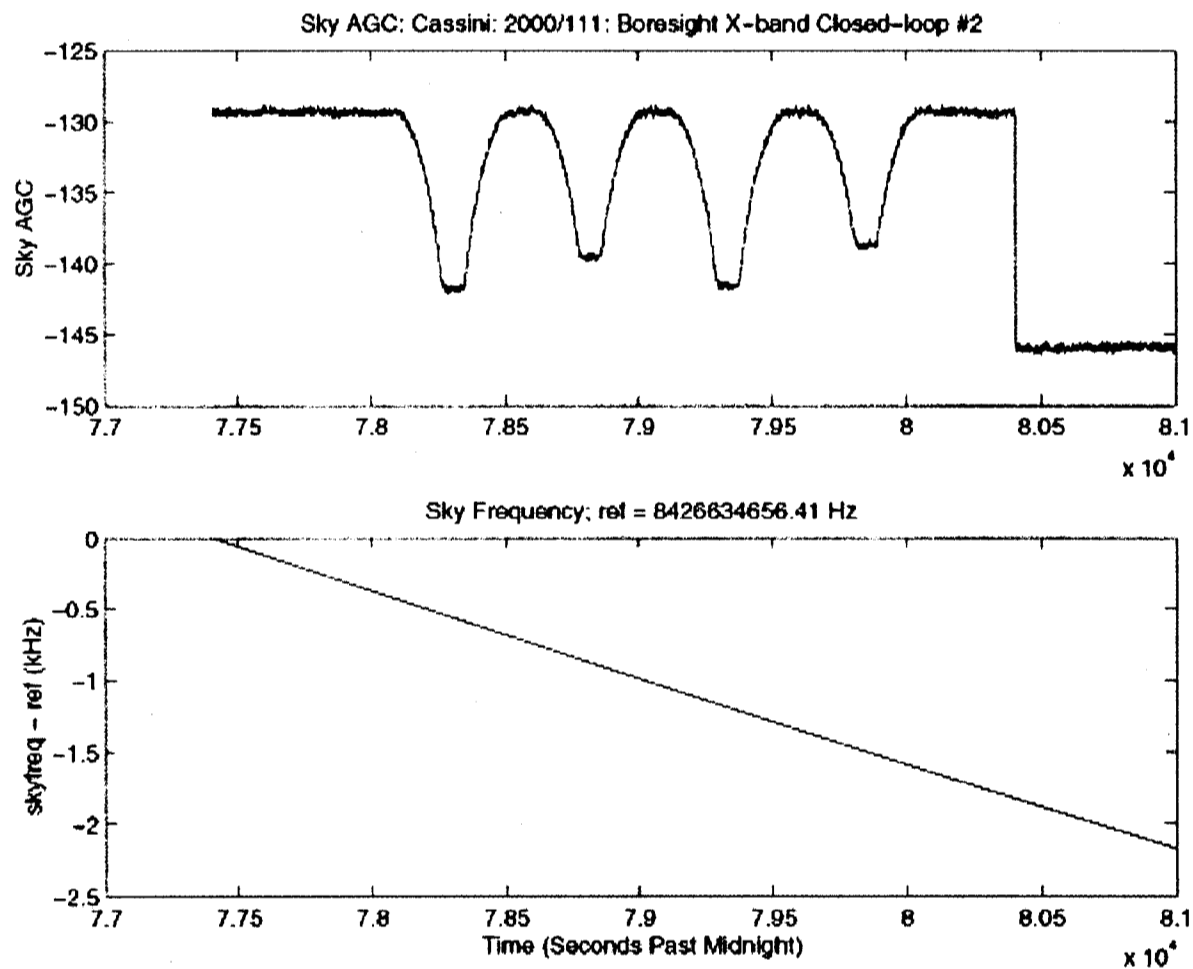
Boresight #1a: Ka-band Open-loop (pnting vs. pwr)



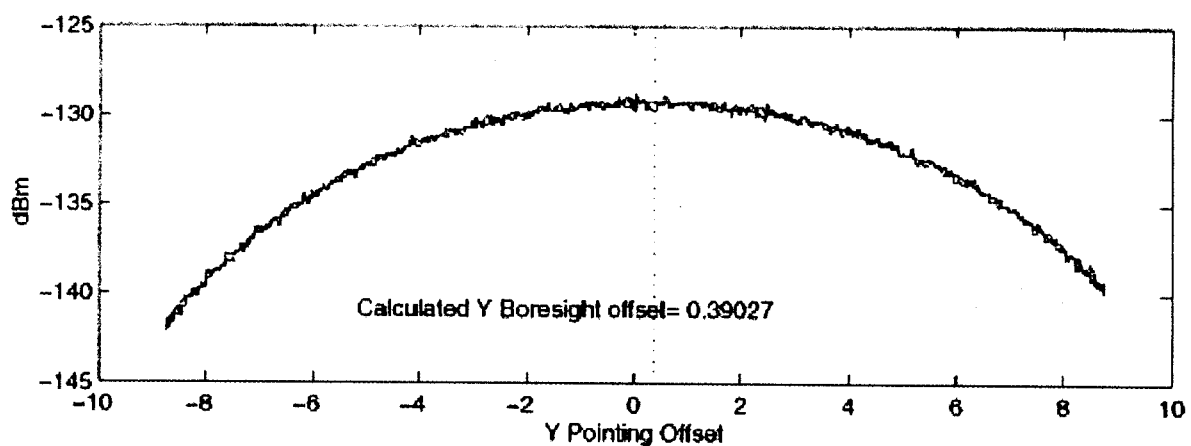
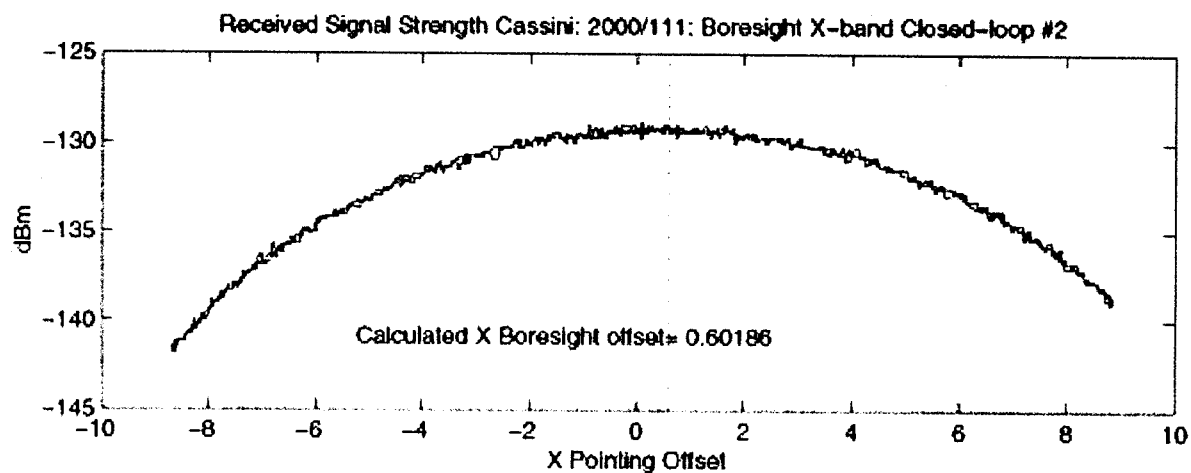
Boresight #1a: Ka-band Open-loop (pnting vs. pwr)



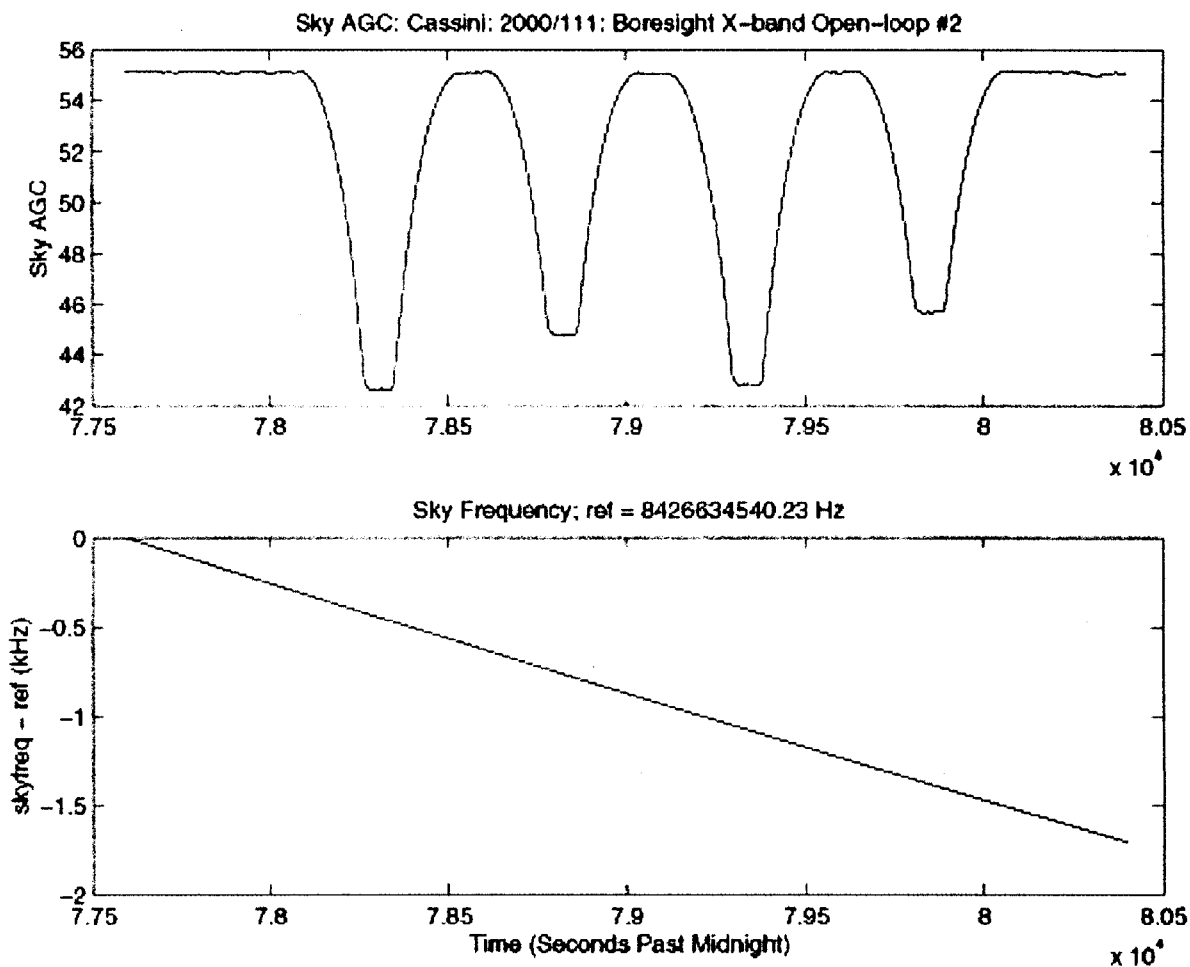
Boresight #1b: X-band Closed-loop (time vs. AGC)



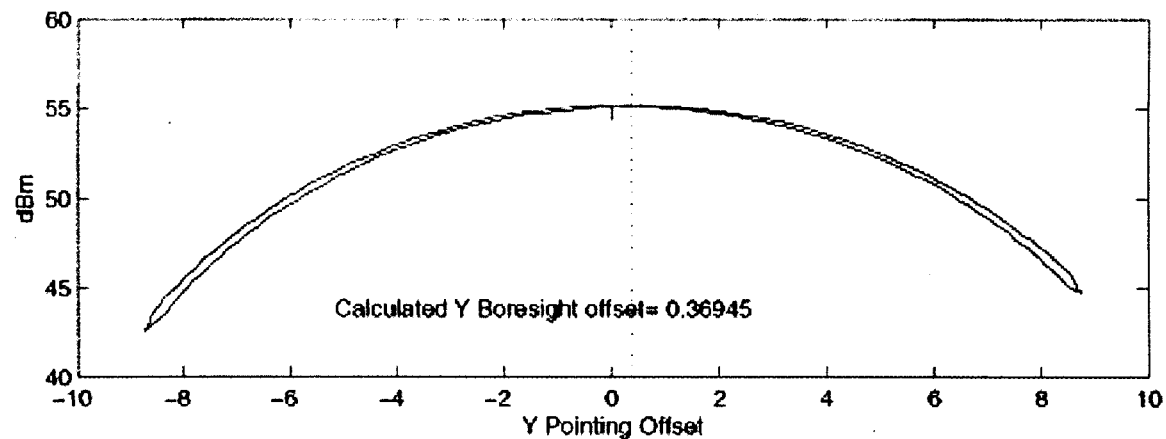
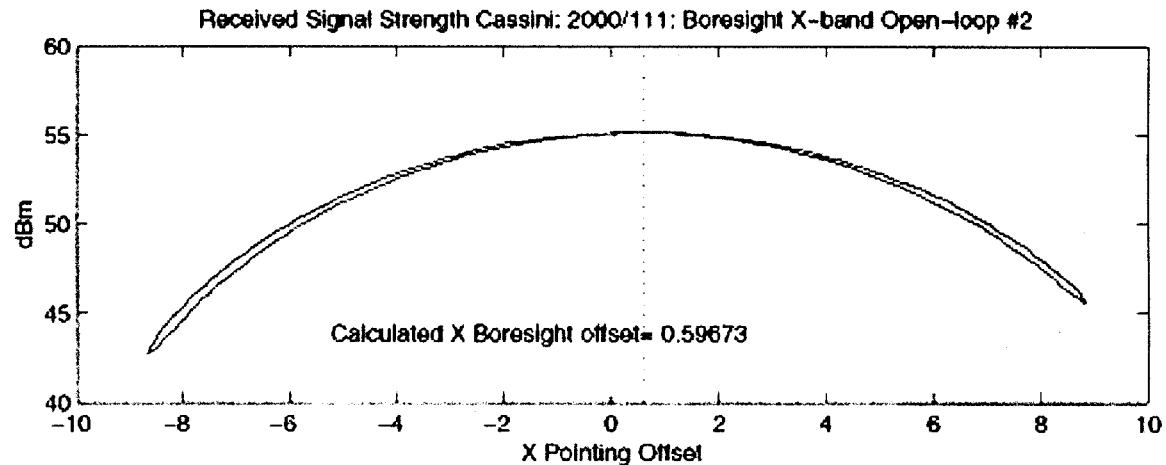
Boresight #1b: X-band Closed-loop (pnting vs. pwr)



Boresight #1b: X-band Open-loop (time vs. AGC)



Boresight #1b: X-band Open-loop (pnting vs. pwr)



Pattern Ka-band Open-loop

Pattern X-band Open-loop

Boresight and Pattern Comments

- Final report on Pattern and Boresight Cals next Team Meeting
- Results generally comparable with AACCS
 - still working some issues
- Can't make a change to the maneuvers in September because Jupiter Science Planning is integrating the pointing profile much earlier than previous plan
 - Boresight Plan is similar to April: 1 maneuver .5 degrees
 - Pattern Plan is identical to April
- July Boresight: slight change at AACCS's request
 - 1 maneuver .5 degrees for optimized X-band
 - 1 maneuver .2 degrees for optimized Ka-band
- April 2001 Boresight we can change, deadline next Team Meeting
- AACCS would like to schedule an HGA Boresight Cal soon after probe release
 - mechanical alignment changes to spacecraft
 - Pattern?
- Other